Journal of the Society of Arts.

FRIDAY, SEPTEMBER 6, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £427,400, have been attached to the Deed.

The following arrangements, in addition to those already published, have been made in foreign countries and the colonies:—

NORWAY.

Mr. Emil Tidemand, of the Royal Norwegian Department for the Interior, Knight of the order of St. Olaf, has been definitely appointed Commissioner, and will be sent to London to assist in the arrangements, and to attend to the interests of Norwegian exhibitors.

ST. VINCENT.

The following are the Commissioners:—The Hon. Charles Douglas Stewart; James Mayer Grant, Esq.; David Cowie, Esq.; Robert Checkley, Esq., M.D.; and George Hammond Hawtayne, Esq.

ST. HELENA.

A Commission has also been appointed, consisting of a Committee of the "Island Society," of which Mr. George Moss is President. Mr. N. Solomon has been nominated Commissioner in England.

It has been intimated to her Majesty's Commissioners for the Exhibition of 1862, that the period fixed upon by Austria for the Exhibition of Works of Art, will date from Heinrich Füger's admission to the Academy of Vienna (1784).

The Paris correspondent of the *Times* says:—

"The French Imperial Commission for the Universal Exhibition of 1862 publishes a note, dated the 2nd inst., in which it declares that the operations of the juries of the Seine and the other departments are approaching their conclusion. The number of admissions proposed by them amount at present to upwards of 7,000. If it be borne in mind, observes the notice, that the whole space attributed to France is 11,160 square metres, of which two-thirds must be deducted for the walking space reserved to the public, it will be found that each exhibitor can obtain only half a square metre. In 1851, 1,700 French exhibitors were allowed 9,300 square metres, of which 3,100 were positively occupied by goods, giving nearly five square metres for each exhibitor. The Imperial Commission consequently will find itself compelled by the force of circumstances to reduce considerably the number of admissions, if the application for additional space which has been made to the British Commissioners should not receive, before the 15th instant, a favourable reply. The Imperial Commission will be shortly prepared to give a list of names of agents who can fit up the stalls for the French exhibitors or to represent them during the Exhibition, but without undertaking any responsibility as to the conduct of these agents. The rest of the notice is occupied with an account of the decisions come to by the British Commissioners relative to the recompenses to be given and to the formation of the national jury which will be charged to award them."

NOTICE TO INSTITUTIONS.

A copy of the Programme of Examinations for 1862, with the Appendix, has been forwarded to each Institution in Union. Additional copies may be obtained on application to the Secretary of the Society of Arts.

A copy of Miss Nightingale's "Notes on Nursing," referred to in Mr. Chadwick's letter (page 712), has also been forwarded to each Institution.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION OF 1862.

BY P. L. SIMMONDS.

No. III.—THE WEST INDIAN COLONIES.

Coming under the popular designation of the West Indies, Great Britain has seventeen colonial dependencies, namely:—Jamaica, Turk's and Caicos Islands, Honduras, Bahamas, Barbados, St. Vincent, Grenada, Tobago, St. Lucia, Antigua, Montserrat, St. Christophers, Nevis, Virgin Islands, Dominica, British Guiana, and Trinidad. Judging from present appearances, only a very few of these will be represented by contributions of their products to the International Exhibition. I cannot but regret this apathy and indifference on the part of the West Indies, because I have a personal knowledge of many of the islands, and have long laboured to advance the general interests of Barbados, Jamaica, and others. It is true some of them have suffered from want of labour, but generally they have suffered more from attention being exclusively given to one or two main staples. With abundance of luxuriant soil and the advantages of a tropical climate, one great staple product after another has been abandoned, and cotton, coffee, indigo, and other remunerative articles have passed away to the East. At a time when fibrous substances, paper materials, woods, &c., are in increased demand, many of these possessions could have astonished our manufacturers and merchants with abundant and suitable supplies had they been so inclined.

If we look at the progress of the principal West Indian Colonies in the past ten years, we shall find that it can make no comparison with that of the African, Australian, or American Colonies.

In 1851 the exports from the British West India Colonies and Demerara consisted of 3,048,958 cwts. of sugar, 3,942,013 gallons of rum, and 5,731,640 lbs. of coffee. In 1859 the exports were 3,127,705 cwts. of sugar, 5,9913,784 gallons of rum, and 2,573,309 lbs. of coffee. Thus, while the sugar produce is about the same, the rum has increased about 2,000,000 gallons, and the coffee has declined fully one-half. The other West Indian exports comprise the following articles, and it is to these we should like to see greater attention given, as both yielding profitable returns, and varying the attention and labour of producers. Pine apples in large numbers come from the Bahamas, a trade only commenced by small imports at Liverpool in 1842, but the trade now chiefly centres in London, and ten or twelve vessels arrive during each season freighted with this fruit, each cargo comprising from 20,000 to 40,000 pine apples. These meet with a ready sale, owing to the large demand for preserves and confectionary purposes. The culture in the Bahamas has been much improved, and better prices are obtained by the growers, owing to the competition, for the British and American markets.

The trade is carried on by sailing vessels, as steamers were found to heat and ripen the fruit too quickly.

About one million cocoa-nuts are shipped, but what is this small number compared to what might be grown? Coir and oil, manufactured from the cocoa-nut, are absolutely imported into the West India colonies. Barbados ships about 126,000 lbs. of superior aloes, a profitable small crop. The other West Indian exports comprise 16,210 cwts. of arrow-root, chiefly from St. Vincent and Barbados, being nearly two-thirds of our whole import. Although the manufacture of this starch is now extensively carried on at Natal, Sierra Leone, Penang, and other quarters, it cannot compete in quality with the true Maranta arrow-root of Bermuda and St. Vincent. The exports of West Indian cocoa amounted to 4,211,185 lbs., chiefly from Trinidad, Grenada, and St. Lucia; the quantity taken for consumption here is about 3,000,000 to 3,500,000 lbs. per annum. The exports of pimento from Jamaica were 15,280 cwts.; but why are not the aromatic leaves utilised, and an oil distilled from them and the berries?

Ginger is another spice or condiment which the West India colonies export, to the amount of 5,000 cwts. Cotton is beginning again to appear more frequently in the exports, reaching now in the aggregate about 1,500 cwts. To these have to be added 10,000 or 12,000 tons of logwood and fustic, 2,471 cwts. of hides, about 5,000 lbs. of tortoise-shell, and 207,450 lbs. of common sponge from the Bahamas. But even taking the whole of these miscellaneous articles of export, what a small proportion do they bear to the abundant natural productions of the islands, and to those which might be so largely extended by culture, whether for food, for the arts, or manufactures.

Passing on from this preliminary survey of their export trade, let us see what are the prospects, as far as yet known, of our West Indian colonies, competing with other countries in an exhibition of their productions in London next year. With the exception of such colonies as Demarara, Trinidad, and Jamaica, which are expected to become extensive contributors, very little will, I fear, be accomplished by the lesser colonies. The people of these islands take no interest in any pursuits that are not immediately connected with the production of sugar. This is much to be regretted, because the French colonies of Martinique, Guadaloupe, and Guiana are likely to be well represented. At the Paris Exhibition their varied products attracted much attention, and have been collected and retained in a permanent Colonial Exposition at the Palace of Industry. The absence of a good colonial museum in this country, where the products of our fifty colonies, scattered over all climates, could be seen and examined, is much to be regretted.

In 1851, out of 5,500 feet allotted for the West Indian Colonies, only 742 feet were occupied. British Guiana and Trinidad were well represented, and a few odds and ends were sent from Barbados, Bahamas, Jamaica, and St. Kitts, but no general interest was taken in the International Exhibition. In 1855, at Paris, through the exertions of the Royal Society of Arts, Jamaica was well represented by about 45 exhibitors, the collection occupying about 483 feet of space. British Guiana occupied 357 feet, and there were 95 exhibitors. The only other West Indian Colonies that took part in the Paris Exhibition were Barbados, 3 exhibitors, and Bahamas, 5.

In St. Lucia, my friend Mr. Breen, the Governor (well-known as the historian of the colony), informs me in a private letter, that he has published in the "Official Gazette" of the island the various circulars and documents received from H.M. Commissioners and the Colonial Office, and also a notice, inviting such of the inhabitants as might be desirous of becoming contributors, to notify their intention to the Executive, giving a description of the articles which they propose to send for exhibition. To this invitation no response has yet been made. The island is in a flourishing condition, and the planters and inhabitants seem intent on nothing but making money. Some little attention given to other products than sugar might not, however, be out of place.

Governor Kortright, in a dispatch to His Excellency Governor Hincks, the Governor-General of the Windward Islands, states that the House of Assembly of Grenada, acting on his suggestion, has appointed Messrs. Davison, Purcell, Alex. Hall, Sinclair, Steeles, and Dr. Wells, to be the Commissioners for that island.

The following gentlemen have been appointed a Commission for the purpose of communicating with her Majesty's Commissioners, and forming a collection of objects for exhibition from Trinidad:—His Excellency the Governor (R. W. Keate, Esq.), the Hon. C. W. Warner, C.B., the Hon. D. Mitchell, Herman Crüger, Esq. (Government Botanist), Charles Feez, Esq., and Sylvester Devenish, Esq., the latter gentleman to act as secretary. The agent to act for the colony in England has not yet been selected, but application for space to the amount of 200 superficial feet has been made.

The Legislature of British Guiana has already voted the sum of £1,000, and will probably grant more. Mr. Wodehouse having relinquished the government of this colony, the provisional administration thereof has devolved upon Wm. Walker, Esq., as Lieutenant-Governor, who has taken a great interest in the due representation of the Colony. To the Royal Agricultural and Commercial Society of British Guiana has been delegated the management of all affairs connected with the Local Exhibition of 1861, and the London Exhibition of 1862. It is the intention of the Society to forward to London as large and complete a collection of the productions of the colony as the time and means at their disposal will permit, and which it is anticipated will not be inferior to the contribution forwarded to Paris, in 1855, that gained for British Guiana the gold medal of honour. The preliminary local show was to be held in Georgetown, in the past month (August), and the articles selected from this show would be transmitted to London early next year.

A few years ago, there was held at Georgetown a public exhibition of live stock, ground provisions, coffee, sugar, seeds, barks, woods, cotton, plantain fibre, vegetable oils, and other articles grown or manufactured in the colony. Of the things then exhibited, many (such as cotton and other fibrous substances, woods, oils, &c.) are in great demand in England, whilst others are constantly needed for local consumption.

Premiums were given, through the liberality of His Excellency the Governor and the Legislature, to those who sent the best specimens of colonial productions or manufacture. A considerable number of the things thus brought together were afterwards forwarded to the Paris Exhibition in 1855, where they created no small interest, and led to much inquiry concerning this colony, its people, and its capabilities of furnishing many valuable articles sought after by those living in other parts of the world.

Local exhibitions have been found to work well in Europe and also in other of the West India Colonies, in some of which, I believe, such collections of native produce and manufacture are presented to the public view every year.

A powerful stimulus has been given by them to industry, skill, and forethought, that has promoted moral improvement as well as material prosperity, and it is believed that such a means of social progress will prove as beneficial in Demerara as in other lands.

In the close of last year a general committee of nearly 100 of the most intelligent and influential colonists was appointed for the purpose of promoting the interests of the Local Exhibition, intended to be held, and a Museum, and also to aid the colonial collection for the International Exhibition in London. Special sub-committees of those best acquainted with the several subjects were formed; for saccharine productions and articles of food prepared for exportation; for fibrous substances; for materials used in chemical arts and in medicine; wood for building and other purposes; for natural history; for

Indian manufactures; for live stock, agricultural implements, &c., and for vegetables, fruits, and flowers.

In the address of the Committee of Correspondence of the Royal Agricultural and Commercial Society of British Guiana, they state that they conceive that the time had arrived when they might with propriety appeal to the survivors of the General Committee, through whose exertions in 1854-55 the colony was so worthily represented by specimens of its products at the Paris Exhibition, and to all others who take a practical interest in the promotion of its prosperity, for their support to an endeavour again to bring its value and importance to the notice of the intelligent and enterprising capitalists of Europe.

If, on the one hand, it may be frankly admitted that little direct benefit, in a commercial point of view, seems to have resulted from previous efforts of this description, it should, on the other hand, be remembered that the variety and magnitude of the resources of the colony, then almost for the first time brought in a tangible shape under the observation of the curious and scientific, elicited the strongest expressions of surprise, and stimulated inquiry as to the possibility of turning them to account. It is manifestly only by perseverance in the course upon which we have thus entered, that final success can be hoped for. Eager as are the manufacturers at home to be put in possession of new staples, and to have the command of other raw materials, they cannot be expected, at such a distance from these localities, to undertake the entire risk of the experiment. To place such products in the markets must devolve on others, and once so placed there is little room to fear that anything intrinsically valuable will fail of receiving a fair share of attention or of being tested to the utmost as to its applicability to useful purposes.

It is undeniable that there is a large proportion of labour-power existing in this colony which does not yield commensurate returns; it is equally so that, apart from the great staples on which the welfare of the colony must no doubt mainly depend, there are multifarious products now neglected or wasted which would afford remunerative employment to by no means excessive exertion. Take, for example, the bark and seeds of the greenheart; the starch producing roots; plants yielding tannin or dye stuffs, or vegetable oils; cotton, coffee, ginger, and peppers; the improved preparation of charcoal, rendering available the pyroligneous acid and other products now lost; not to speak of plantain fibre, which the possession of the simplest machinery would enable the small proprietor easily to convert into an auxiliary source of profit of no small importance; and we see at once neglected, yet obvious, means of comparative wealth to the rural population and of augmented benefit to the general interest. But for the accomplishment of all this, or even of any portion of it, an organized agency is wanting, and it is that which the Committee of Correspondence propose, through the medium of the General Committee, to supply.

By bringing home to the convictions of the peasantry the benefits derivable from regular attention to the culture of the vegetable treasures which nature places spontaneously, or nearly so, within their reach, and by providing them with a market for the produce of such labour, the strongest possible influence will be brought to bear upon them for good, and the most powerful inducement to discharge their duties as members of the community. There may be many who will doubt the possibility of success; there are none who ought not to desire it, and few who could not, in some way or to some extent, assist in its attainment.

As on former occasions, a list of objects, to which it is deemed desirable that attention should be especially directed, is appended for the guidance of those who are disposed to render their assistance.

In the first division of raw materials and produce, specimens in duplicate, and where possible in triplicate, have been obtained.

The Committee of Correspondence add that they cannot, perhaps, more appropriately close their present address than by quoting some passages from their original prospectus of 1854.

"The Executive Committee are impressed with the belief that there will not be wanting suitable responses to an invitation to the artisans, small freeholders, and farmers, and even to the labourers of the colony, to produce at a Public Exhibition samples of the results of extra care and diligence bestowed upon the raising of stock, the cultivation of fruits, vegetables, and flowers, and the practice of the mechanical arts. In order to afford every reasonable encouragement to those classes to do this, the Executive Committee propose that suitable prizes, a specification of which will be published as soon as practicable, shall be awarded to the producers of the best articles, whether contributed for the London Exhibition or the Museum, or sent for the Local Exhibition alone.

"It is obvious, that as what can be done well once can be always as well done, if proper energy be manifested, there will be a local demand created for the improved specimens of the results of labour and skill applied in the branches to which allusion has been made. But more than this, the Executive Committee, being in correspondence with the Society of Arts in London, propose to give such successful competitors as may bring forward articles capable of being preserved sufficiently long, the additional advantage of transmitting their specimens to London, thus opening up a prospect of a wider field and more extensive market, while contributing to augment the variety of exportable products of this colony.

"The Executive Committee desire it to be distinctly understood, that while they have specially in view the object of affording a wholesome stimulus to the industry and skill of the humbler classes of society, and while they indicate certain kinds of objects as being of more peculiar and general interest, individuals of all classes will be alike welcomed to the proposed competition, nor will any article be excluded from the benefits of the scheme they have undertaken to carry out.

"They have but one aim: it is to promote the wise and enlightened intentions of the Legislature by augmenting the general mass of wealth, in encouraging the humblest classes to come forward and shew what can be done by mutual co-operation for a common object, unimportant, and even trifling, as some of the efforts may appear to be if regarded individually. The Executive Committee are convinced that the object can be attained; but while no effort of theirs shall be wanting to achieve it, the issue rests not with them alone; they must be supported by the good feeling, intelligence, and, they will add, patriotism, of the classes whose benefit they more especially seek, or success, which with such support would be certain, will not be secured."

At a meeting of the Royal Agricultural and Commercial Society of British Guiana, held on the 2nd April, it was unanimously carried that J. T. Gilbert, Esq., Vice-President, and Sir William H. Holmes, as Secretary, should be named to represent the Colony as delegates at the coming Exhibition in London, in 1862, and that his Excellency the Governor be respectfully requested to communicate this appointment to the Right Hon. the Colonial Secretary of State and to the Exhibition authorities. Both these gentlemen have arrived in England. It is not certain whether Mr. Gilbert's professional avocations as a barrister in the Colony, will permit of his being present at the Exhibition; but Sir W. H. Holmes, who so efficiently represented the Colony in Paris during the Exhibition of 1855, hopes to obtain an extension of his leave of absence to enable him to do so.

In a letter from the Council of the Royal Society of Arts, Jamaica, to his Excellency Governor Darling, dated 13th August, 1860, they state that "The Committee which was appointed for the proposed International Exhibition depended very much for their course of action on the information they should receive from their lamented co-adjutor, the Hon. Mr. Wilkinson, on his expected return to this island. That gentleman undertook, while in

London, to make himself master of the whole subject, and on his return to communicate with the Council as to what would be the best means of promoting the interests of the colony in the said Exhibition. The unfortunate demise of this worthy gentleman has frustrated, in the mean time, the hopes of the Council in this respect.

"I am requested to assure your Excellency that the Council are feelingly alive to the good that will probably result to Jamaica from an abundant illustration of the resources of this island in the said Exhibition, by an accumulation of specimens of the natural and artificial products of the country. The Council have determined to use every exertion in their power to render this department entirely and in every way creditable to this island, if the means are afforded them by the Island Legislature. They will allow nothing to interfere with their transmission to the International Exhibition of such an amount of island products as shall win for the Colony similar honours as were achieved for her by the Great Paris Exhibition of 1855."

His Excellency Governor Darling, in a despatch to the Secretary of State for the Colonies, dated July 6, announces that he has appointed the Council of the Royal Society of Arts of Jamaica to be the Commission or central authority for that colony, for the International Exhibition. His Excellency adds, however, that he is afraid little will be done in forwarding the necessary arrangements, until it shall be ascertained whether the Legislature will sanction any and what amount of money for the purpose.

In St. Vincent, a Commission of five gentlemen has been appointed, according to the following official announcement:—"Colonial Secretary's Office, St. Vincent, 25th July, 1861.—His Honour the Administrator of the Government has this day been pleased to appoint the Honourables Charles Douglas Stewart, James Mayer Grant, David Cowie, and Robert Checkley, M.D., and George Hammond Hawtayne, Esquires, to be Commissioners for Saint Vincent, for making and carrying out arrangements in connection with the International Exhibition of 1862, in accordance with the Resolution of the Legislature in that behalf.—BOUVERIE ALLEYNE, Colonial Secretary."

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-first Annual Meeting of this Association commenced on Wednesday, the 4th of September, at Manchester, under the direction of the following officers:—

PRESIDENT.—William Fairbairn, Esq., LL.D., C.E., F.R.S.

VICE-PRESIDENTS.—The Earl of Ellesmere, F.R.G.S.; the Lord Stanley, M.P., D.C.L., F.R.G.S.; the Lord Bishop of Manchester, D.D., F.R.S., F.G.S.; Sir Philip de Malpas Grey Egerton, Bart., M.P., F.R.S., F.G.S.; Sir Benjamin Heywood, Bart., F.R.S.; Thomas Bazley, Esq., M.P.; James Aspinall Turner, Esq., M.P.; James Prescott Joule, Esq., LL.D., F.R.S., President of the Literary and Philosophical Society of Manchester; Joseph Whitworth, Esq., F.R.S., M. Inst. C.E.

GENERAL SECRETARY.—Rev. Robert Walker, M.A., F.R.S., Professor of Experimental Philosophy, Oxford.

ASSISTANT-GENERAL SECRETARY.—John Phillips, Esq., M.A., LL.D., F.R.S., F.G.S., Professor of Geology, Oxford.

GENERAL TREASURER.—John Taylor, Esq., F.R.S.

LOCAL SECRETARIES.—Robert Dukinfield Darbishire, Esq., B.A., F.G.S., 21, Brown-street, Manchester; Alfred Neild, Esq., Mayfield, Manchester; Arthur Ransome, Esq., M.A., St. Peter's-square, Manchester; Professor Henry Enfield Roscoe, B.A., Owens College, Manchester.

LOCAL TREASURER.—Robert Philips Greg, Esq., F.G.S., Manchester.

The Council met at ten o'clock in the morning, and at one o'clock the General Committee held its first meeting in the Town-hall, for the election of sectional officers and the despatch of business.

The First General Meeting of the Association was held in the Free Trade-hall, at Eight P.M., when the President, Lord Wrottesley, F.R.S., resigned the chair, and William Fairbairn, Esq., LL.D., F.R.S., assumed the Presidency, and delivered his address, in the course of which he said:—

"The largest developments of chemistry, have been in connection with the useful arts. What would now be the condition of calico-printing, bleaching, dyeing, and even agriculture itself, if they had been deprived of the aid of theoretic chemistry?

"For example: Aniline—first discovered in coal tar by Dr. Hofmann, who has so admirably developed its properties—is now most extensively used as the basis of red, blue, violet, and green dyes. This important discovery will probably in a few years render this country independent of the world for dye stuffs; and it is more than probable that England, instead of drawing her dye stuffs from foreign countries, may herself become the centre from which all the world will be supplied.

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"In noticing the more recent discoveries in this important science, I must not pass over in silence the valuable light which Chemistry has thrown upon the composition of iron and steel. Although Despretz demonstrated many years ago that iron would combine with nitrogen, yet it was not until 1857 that Mr. C. Binks proved that nitrogen was an essential element of steel, and more recently M. Carou and M. Fremy have further elucidated this subject; the former showing that cyanogen, or cyanide of ammonium, is the essential element which converts wrought iron into steel; the latter combining iron with nitrogen through the medium of ammonia, and then converting it into steel by bringing it at the proper temperature into contact with common coal-gas. There is little doubt that in a few years these discoveries will enable Sheffield manufacturers to replace their present uncertain, cumbrous, and expensive process, by a method at once simple and inexpensive, and so completely under control as to admit of any required degree of conversion being obtained with absolute certainty. Mr. Crace Calvert also has proved that cast-iron contains nitrogen, and has shown that it is a definite compound of carbon and iron mixed with various proportions of metallic iron, according to its nature.

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"Having glanced, however imperfectly, at some of the most important branches of science which engage the attention of members of this Association, I would now invite attention to the mechanical sciences with which I am more familiarly acquainted. They may be divided into theoretical mechanics and dynamics, comprising the conditions of equilibrium and the laws of motion; and applied mechanics, relating to the construction of machines. I have already observed that practice and theory are twin sisters, and must work together to ensure a steady progress in mechanical art. Let us then maintain this union as the best and safest basis of national progress, and, moreover, let us recognise it as one of the distinctive aims of the annual reunions of this Association."

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"Viewing the past, with a knowledge of the present and a prospect of the future, it is difficult to estimate sufficiently the benefits that have been conferred by the application of mechanical science to the purposes of navigation. Power, speed, and certainty of action, have been attained on the most gigantic scale. The celerity with which a modern steamer, with a thousand tons of merchandise, and some hundreds of human beings on board, cleaves the water and pursues her course, far surpasses the most sanguine expectations of a quarter of a century ago, and, indeed, almost rivals the speed of the locomotive itself. Previous to 1812, our intercourse with foreign countries and with our colonial possessions depended entirely upon

the state of the weather. It was only in favourable seasons that a passage was open, and we had often to wait days, or even a week, before Dublin could be reached from Holyhead. Now, this distance of sixty three miles is accomplished in all weathers in little more than three hours. The passage to America used to occupy six weeks or two months; now it is accomplished in eight or nine days. The passage round the Cape to India is reduced from nearly half a year to less than a third of that time, whilst that country may be reached by the overland route in less than a month. These are a few of the benefits derived from steam navigation, and as it is yet far from perfect, we may reasonably calculate on still greater advantages in our intercourse with distant nations.

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"Previously to the inventions of Henry Cort, the manufacture of wrought iron was of the most crude and primitive description. A hearth and a pair of bellows was all that was employed. But since the introduction of puddling the iron-masters have increased the production to an extraordinary extent, down to the present time, when processes for the direct conversion of wrought iron on a large scale are being attempted. A consecutive series of chemical researches into the different processes, from the calcining of the ore to the production of the bar, carried on by Dr. Percy and others, has led to a revolution in the manufacture of iron; and although it is at the present moment in a state of transition, it nevertheless requires no very great discernment to perceive that steel and iron of any required tenacity will be made in the same furnace, with a facility and certainty never before attained. This has been effected, to some extent, by improvements in puddling; but the process of Mr. Bessemer,—first made known at the meeting of this Association at Cheltenham,—affords the highest promise of certainty and perfection in the operation of converting the melted pig direct into steel or iron, and is likely to lead to the most important developments in this manufacture. These improvements in the production of the material must, in their turn, stimulate its application on a larger scale and lead to new constructions."

"In iron ship-building an immense field is opening before us. Our wooden walls have, to all appearance, seen their last days; and as one of the early pioneers in iron construction, as applied to shipbuilding, I am highly gratified to witness a change of opinion that augurs well for the security of the liberties of the country. From the commencement of iron shipbuilding in 1830 to the present time, there could be only one opinion amongst those best acquainted with the subject, namely, that iron must eventually supersede timber in every form of naval construction. The large ocean steamers, the *Himalaya*, the *Persia*, and the *Great Eastern*, abundantly show what can be done with iron, and we have only to look at the new system of casing ships with armour plates, to be convinced that we can no longer build wooden vessels of war with safety to our naval superiority and the best interests of the country. I give no opinion as to the details of the reconstruction of the navy—that is reserved for another place,—but I may state that I am fully persuaded that the whole of our ships of war must be rebuilt of iron, and defended with iron armour calculated to resist projectiles of the heaviest description at high velocities.

"In the early stages of iron shipbuilding, I believe I was the first to show, by a long series of experiments, the superiority of wrought-iron over every other description of material in security and strength, when judiciously applied, in the construction of ships of every class. Other considerations, however, affect the question of vessels of war; and although numerous experiments were made, yet none of the targets were on a scale sufficient to resist more than a six-pounder shot. It was reserved for our scientific neighbours, the French, to introduce thick iron plates as a defensive armour for ships.

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"We have already seen a new era in the history of the construction of bridges, resulting from the use of iron; and we have only to examine those of the tubular form over the Conway and Menai Straits to be convinced of the durability, strength, and lightness of tubular constructions applied to the support of railways or common roads, in spans which, ten years ago, were considered beyond the reach of human skill. When it is considered that stone bridges do not exceed one hundred and fifty feet in span, nor cast-iron bridges two hundred and fifty feet, we can estimate the progress which has been made in crossing rivers four hundred or five hundred feet in width, without any support at the middle of the stream. Even spans greatly in excess of this may be bridged over with safety, provided we do not exceed eighteen hundred to two thousand feet, when the structure would be destroyed by its own weight.

"It is to the exactitude and accuracy of our machine tools that our machinery of the present time owes its smoothness of motion and certainty of action. When I first entered this city, the whole of the machinery was executed by hand. There were neither planing, slotting, nor shaping machines, and with the exception of very imperfect lathes and a few drills, the preparatory operations of construction were effected entirely by the hands of the workmen. Now everything is done by machine tools, with a degree of accuracy which the unaided hand could never accomplish. The automaton, or self-acting machine tool, has within itself an almost creative power; in fact, so great are its powers of adaptation, that there is no operation of the human hand that it does not imitate. For many of these improvements the country is indebted to the genius of our townsmen, Mr. Richard Roberts and Mr. Joseph Whitworth.

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"Amongst the changes which have largely contributed to the comfort and enjoyment of life, are the improvements in the sanitary condition of towns. These belong, probably, to the province of social, rather than mechanical science; but I cannot omit to notice some of the great works that have of late years been constructed for the supply of water and for the drainage of towns. In former days, ten gallons of water to each person per day was considered an ample allowance. Now thirty gallons is much nearer the rate of consumption."

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"The greatest undertaking of this kind, yet accomplished, is that by which the pure waters of Loch Katrine are distributed to the city of Glasgow. This work, recently completed by Mr. Bateman, who was also the constructor of the water-works of this city, is of the most gigantic character, the water being conveyed in a covered tunnel a distance of twenty-miles, through an almost impassable country, to the service reservoir, about eight miles from Glasgow. By this means forty million gallons of water per day are conveyed through the hills which flank Ben Lomond, and after traversing the sides of Loch Chon and Loch Aird, are finally discharged into the Mugdock basin, where the water is impounded for distribution.

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"Irrespective of inland and international telegraphy, a new system of communication has been introduced by Professor Wheatstone, whereby intercourse can be carried on between private families, public offices, and the works of merchants and manufacturers. This application of electric currents cannot be too highly appreciated, from its great efficiency and comparatively small expense. To show to what an extent this improvement has been carried, I may state that one thousand wires, in a perfect state of insulation, may be formed into a rope not exceeding half an inch in diameter.

"I must not sit down without directing attention to a subject of deep importance to all classes, namely, the amount of protection the inventors should receive from the laws of the country. It is the opinion of many that patent laws are injurious rather than beneficial, and that

no legal protection of this kind ought to be granted; in fact, that a free trade in inventions, as in everything else, should be established. I confess I am not of that opinion. Doubtless there are abuses in the working of the patent law as it at present exists, and protection is often granted to pirates and impostors, to the detriment of real inventors. This, however, does not contravene the principle of protection, but rather calls for reform and amendment. It is asserted by those who have done the least to benefit their country by inventions, that a monopoly is injurious, and that if the patent laws are defended it should be—not on the ground of their benefit to the inventor—but on that of their utility to the nation. I believe this to be a dangerous doctrine, and I hope it will never be acted upon. I cannot see the right of the nation to appropriate the labours of a lifetime, without awarding any remuneration. The nation, in this case, receive a benefit; and assuredly the labourer is worthy of his hire. I am no friend of monopoly, but neither am I a friend to injustice; and I think that before the public are benefited by an invention, the inventor should be rewarded either by a fourteen years' monopoly, or in some other way. Our patent laws are defective, so far as they protect pretended inventions; but they are essential to the best interests of the State in stimulating the exertions of a class of eminent men, such as Arkwright, Watt, and Crompton, whose inventions have entailed upon all countries invaluable benefits, and have done honour to the human race. To this Association is committed the task of correcting the abuses of the present system, and establishing such legal provisions as shall deal out equal justice to the inventor and the nation at large.

"I must not forget that we owe very much to an entirely new and most attractive method of diffusing knowledge, admirably exemplified in the Great Exhibition of 1851, and its successors in France, Ireland, and America. Most of us remember the gems of art which were accumulated in this city during the summer of 1857, and the wonderful results they produced on all classes of the community. The improvement of taste, and the increase of practical knowledge which followed these exhibitions, has been deeply felt; and hence the prospects which are now opening before us in regard to the Exhibition of the next year cannot be too highly appreciated. That Exhibition will embrace the whole circle of the sciences, and is likely to elevate the general culture of the public to a higher standard than we have ever before attained. There will be unfolded almost every known production of Art, every ingenious contrivance in machinery, and the results of discoveries in science from the earliest period. The Fine Arts, which constituted no part of the Exhibition of 1851, and which were only partially represented at Paris and Dublin, wil be illustrated by new creations from the most distinguished masters of the modern school. Looking forwards, I venture to hope for a great success and a further development of the principle advocated by this Association, the union of science and art."

On Thursday (yesterday), the Sectional Meetings commenced. The sections are the following:—

A.—MATHEMATICAL AND PHYSICAL SCIENCE.—*President:* G. B. Airy, Esq., D.C.L., F.R.S., Astronomer Royal.

B.—CHEMICAL SCIENCE.—*President:* W. A. Miller, M.D., F.R.S., Professor of Chemistry, King's College, London.

C. — GEOLOGY. — *President:* Sir R. I. Murchison, G.C.St.S., D.C.L., F.R.S., Director-General of the Geological Survey of the United Kingdom.

D.—ZOOLOGY AND BOTANY.—*President:* C. C. Babington, Esq., M.A., F.R.S., Professor of Botany, Cambridge.

D.—SUB-SECTION PHYSIOLOGY.

E.—GEOGRAHY AND ETHNOLOGY. — *President:* John Crawfurd, Esq., F.R.S., President of the Ethnological Society.

F.—ECONOMIC SCIENCE AND STATISTICS.—*President:* William Newmarch, Esq., F.R.S.

G.—MECHANICAL SCIENCE.—*President:* John F. Bateman, Esq., C.E., F.R.S.

FLAX AND ITS PRODUCTS IN IRELAND.

BY WM. CHARLEY, J.P., SEYMOUR-HILL, NEAR BELFAST.

LETTER XVIII.

Glancing back over the history of the flax plant and its products in Ireland, and surveying the present position of this branch of industry as to progress, in comparison with other textile fabrics of the British Isles, one is struck with the trifling reduction in the cost of the raw material since the early part of this century. Cotton and most other raw materials have undergone a gradual reduction in cost, and the price of the manufactured goods has been much lowered, so as to place the articles within the reach of a larger number of consumers. The price of flax, however, has remained very much the same, and though linen goods are certainly cheaper than formerly, almost the entire saving has been effected by introducing improved means of manufacture; a saving of course not peculiar to the linen trade, but equally enjoyed by all others. I believe the various operations of spinning, weaving, and bleaching flax fibre have from time to time been as much improved as could at all be expected; in fact every thing that skill, science, and capital can do, has gradually been brought to bear in perfecting those departments; but any trade, no matter how well managed, necessarily languishes without the foundation of a plentiful, cheap, and permanent supply of raw material, and that essential foundation has lately been sadly wanting, to the threatened injury of the importaut superstructure.

In order to assist us in forming an opinion as to the best means of overcoming the difficulty of a short supply of flax, let us turn our attention to the chief sources of supply. Let us assume that one-third of the flax required for the United Kingdom is grown in Ireland, producing good, useful, fibre, and the other two-thirds imported (I must say United Kingdom, as we have no perfect statistics of separate shipments to Ireland). Again let us divide the imported fibre into one-half Russian, comprising the coarse fibre, the other half from the remainder of Continental Europe, principally of fine quality. Now in Ireland the amount of flax sown varies as much as 70,000 or 80,000 acres within a few years; for instance, in 1857 it was 91,000 acres, and in 1853, fully 175,000; the difference in value within three years being, probably, £1,000,000; in 1859 the acres were 136,282, and in 1860 only 128,444.

While this variation so evidently exists, the demand for flax remains steady, and is only curtailed by the recent high prices. The exports of linen fabrics from the United Kingdom are about 4½ millions sterling per annum, and the home trade is probably equal—together say 9 millions; to this must be added the value of yarns exported, nearly 2 millions, making a total of 11 millions sterling. Though I cannot say positively, I would certainly estimate that two-thirds of this large sum is represented by the Irish linen trade, and the other third by the productions of Scotland and Yorkshire; however this may be, it is evident a very large quantity of flax is needed for the production of so large an amount of linen fabrics, and the demand would certainly much increase if more moderate rates prevailed.

Irish flax, on the whole, is undoubtedly the best, but the variations referred to make the supply very uncertain; these variations are, no doubt, chiefly caused by the comparative price of grain. When grain brings a high price the breadth of crop under flax is diminished, while if it remains at a low rate the farmer is naturally induced to sow more flax seed. But there is another influence working against an increase of flax cultivated in Ireland, namely, the gradual introduction of the Scotch and English system of tillage farming on a large scale.

As farms increase in size, and labour becomes dearer, it is probable flax will be even less grown; it is essentially the small farmer's crop, sown by himself, and cleaned, pulled, steeped, even scutched by his wife and children, for whom these occupations form a nice, light, agreeable kind of hand-labour.

I may here state that many sensible and thoughtful men do not approve of the present great anxiety shown by some land owners to convert *all* their estates into very large holdings. The small farmer has his failings, and in bad seasons may be behind a little in paying rent, yet we can't do without him altogether. It is from such families the best conducted and most intelligent labourers and artizans are to be had; the former to carry on improved systems of husbandry, under the guidance of trained agriculturists; the latter to create our ships, to erect our houses, to build our bridges, and to contribute in many ways to our general prosperity.

The roving sons of such families often enter our army and navy, and they are no doubt, from their early advantages of education and example, the most likely men to rise to the apparently humble, but really very important, posts of non-commissioned officers.

The small farmer is almost sure to exist, and to thrive in districts where the linen trade is carried on, as he can spend profitably, at scutching or weaving, the winter months that otherwise would be almost unproductive, while the change to agricultural labour in the spring and autumn braces his constitution after the winter's indoor work. In more purely agricultural districts, in addition to some of the small farmers' sons working at large establishments, there is often a cottage or two on his holding, which the ordinary labourer can get at a cheap rent, and these two things working together have a tendency to provide dwelling accommodation, and to prevent more or less that dreadful system of crowded, miserable lodgings for the poor so recently exposed in the south of England.

I do hope and trust that the modern plan of converting estates into large farms (which it must be admitted is a very judicious system within reasonable limits) may not in future be carried too far, and that there may be left a moderate proportion of small-sized farms in every neighbourhood. Anyone who doubts the advantages of doing so should visit the counties of Antrim, Down, and Armagh, where this mixed system is now in existence, and where flax cultivation is also carried on pretty largely. Before "clearing" the large estates in the south-west of Ireland of almost all the unfortunate cottier tenants, would it not be well to try the advantages to be derived from flax cultivation, carefully introduced and gradually extended.

The children of the cottier can greatly assist in this work, and, if moderately well managed, a larger return of profit can be made per acre than by any grain crop.

If the well-known Father Daly would take this matter up, he might confer a benefit on Connaught equal, if not superior, to the establishment of the "Galway" Atlantic line of steamers, for which he has obtained so much credit.

There is a Flax Society formed in Munster—President, Lord Fermoy; Secretary, Mr. J. D. C. Kenefick—and it will be gratifying to hear of their success in that province. They have received every encouragement from the Belfast merchants, and I hope will persevere in their laudable object.

The North-East Agricultural Association of Ireland has formed a sub-committee, consisting of myself, J. Richardson, Esq., and J. Borthwick, Esq., to attend to the growth of flax in Ireland. We issued last spring an amended code of regulations for the management of the crop, and circulated about 1,000 copies through the country.

This committee will doubtless adopt further steps for disseminating information and removing the unreasonable prejudices that, in some localities, still exist. The difficulty they will have to contend with is not so much the growing of the plant as the after-management. Still the Irish are reputed to be as quick-witted as the French or Belgians, who have been so successful in the skilful manipulation of flax, and I believe, with a little attention, in the way of keeping the matter before the agriculturists of this country, much improvement in this respect will result.

The common reply to the question "Why don't you grow flax?" is "That it is too troublesome." The next question naturally is, "But if you get well paid for your trouble, that surely is not a sound objection." Answer—"Well, you see, I have no steeping ponds; and if I put it into the river, I'll get into a row with somebody." This difficulty is in some neighbourhoods greatly felt, and can only be overcome by several adjoining farmers uniting to make a series of ponds in some waste corner, for their mutual accommodation.

This difficulty does not arise in those localities where bogs exist, a common feature in Ireland, as the bog holes do very well for retting flax.

In portions of the county of Derry, where wheat will not ripen, the farmers often grow flax after potatoes, in lieu of that grain, followed by clover and grazing, then oats. "The wheat pays the rent" on rich land, and it is pleasant to find on ground where it won't succeed, an equally profitable crop of national importance take its place.

From Belgium, Holland, and France we cannot expect to find an increased importation; the present high prices for flax are no doubt bringing us now as much as we can reasonably expect.

In Russia the abolition of serfdom, it is said, will rather act against an increased production than otherwise.

In the British North American Colonies hand-labour is too expensive for large investments in flax growing. Attention has therefore more than ever been directed to India, where labour is cheap and abundant, and the evidence given before the House of Commons has so confirmed the impression in favour of trying flax cultivation there on a large scale, that it would appear highly culpable to neglect so favourable an opening. The following extract of a portion of this evidence contains much useful information:—

Mr. Dewar said:—"This statement, which I hand in, will give the imports and produce of Ireland over a period of ten years, showing a very large decrease, more particularly in the present year, and the exports of linen manufactured goods and yarns. [The same was handed in, and is as follows:]

Years.	Imported Flax.	Produce of Ireland.	Total Quantity.	Exports.	
				Linen Manufactures.	Linen Yarn.
	Tons.	Tons.	Tons.	£	£
1848	...	...	...	2,802,789	493,449
1849	90,333	15,000	105,333	3,493,829	732,065
1850	91,145	22,700	113,845	3,947,682	881,312
1851	59,709	36,388	96,097	4,107,396	951,426
1852	70,435	33,965	114,400	4,231,786	1,440,565
1853	94,146	43,374	137,520	4,758,432	1,154,977
1854	65,162	35,606	100,768	4,108,457	944,502
1855	64,672	23,465	88,137	4,118,013	932,981
1856	84,352	27,000	111,352	4,887,780	1,365,980
1857	93,312	24,000	117,312	4,511,454	1,647,879
1858	64,195	26,599	90,794		

The whole of Mr. Dewar's evidence was printed and circulated, and the matter was much discussed at the principal seats of the flaxen manufactures in Great Britain and Ireland.

To Belfast belongs the honour of making the first move; indeed neither Dundee nor Leeds has so far shown any active interest, further than publishing some papers and holding some meetings, the result up to this time being absolutely nothing. To Belfast therefore must be awarded the merit, should the design prove successful; and should it unfortunately turn out an unprofitable speculation, Belfast will *still* deserve praise for having

made so great an effort to procure for the depressed linen trade the much wanted supply of flax fibre.

At a meeting held in the Council Room of the Chamber of Commerce, Belfast, on Tuesday, 13th December, 1859, John Herdman, Esq., President of the Chamber of Commerce, was called to the chair.

D. M'Leod, Esq., Financial Commissioner at Lahore, was introduced to the meeting by the President, and communicated much valuable information regarding the capabilities of India for the production and cultivation of Flax.

Moved by JONATHAN RICHARDSON, Esq., M.P.; seconded by WILLIAM CHARLEY, Esq., J.P.; and

Resolved—"That this meeting is of opinion that the very unsatisfactory state of the linen trade arises chiefly from a deficiency of the raw material, and that an abundant supply, at a low average cost, would tend materially to the prosperity of the trade. This meeting therefore, recommends the promotion of a Company, with limited liability, and a capital of £50,000 in £10 shares, for the purpose of obtaining a supply of flax and other fibres from India."

Moved by JOHN HIND, Esq.; seconded by WILLIAM EWART, Esq.; and

Resolved—"That the following gentlemen—with power to add to their number—be appointed a Committee to carry out the objects of the meeting:—

J. Richardson, Esq., M.P., Wm. Ewart, jun., Esq., J. Charters. Esq., J. Herdman, Esq., Wm. Charley, Esq., J.P., E. H. Thompson, Esq., Finlay M'Cance, Esq., J. Hind, Esq., Wm. Richardson. Esq., Wm. Mitchell, Esq., J. Preston, Esq., C. Finlay, Esq., J. J. Weinberg, Esq."

Moved by JOHN PRESTON, Esq.; seconded by FINLAY M'CANCE, Esq.; and

Resolved—"That the grateful thanks of this meeting be presented to D. M'Leod, Esq., Financial Commissioner at Lahore, for his kind attendance here this day, and for the very valuable information which he has afforded regarding the extension of the cultivation of flax in India."

JOHN HERDMAN, Chairman.
W. M'ILWRATH, Secretary.

The Company above referred to is now constituted, and has sent an experienced agent out to Lahore as a pioneer to prepare the way for more extensive operations.*

Some of the Irish newspapers were alarmed at the result of this meeting, and wrote very strongly on the subject, fearing it was contemplated to improve India at the expense of Ireland.

In order to correct this erroneous impression, I addressed to the editor of the leading agricultural journal in this country the following letter, the effect of which explanation he acknowledged to be satisfactory:—

FLAX CULTIVATION IN IRELAND AND INDIA.

SIR,—I have read your excellent article on flax cultivation, and agree in the general tenor of your remarks. There is, however, one point I wish to call atention to.

The entire of the flax produced in Ireland does not average 30,000 tons a year, while the consumption of flax in our linen manufacture exceeds 100,000. At present, therefore, scarcely one-third of the raw material is grown at home, though great attention has been given to the subject.

Every flax spinner will admit that Irish flax is the best for general use, but he cannot compel the farmers to cultivate it; the best recommendation in his power is the high price he is willing to pay for it when brought to market. The late Royal Flax Society was too much a spinner's society, as explained in my letter of 26th March, to which you refer. It must either be re-established on a broader basis, or the matter must be taken up by the various farming societies, in whom the agriculturists have confidence. I am sure Mr Richardson and myself, as well as every Irishman at the meeting the other day, felt most strongly the necessity and propriety of extending flax cultivation in Ireland; and in proposing a company to develop flax cultivation in India, we were actuated not by any want of sympathy for our native land, but by a desire to secure a large supply of low priced raw material, which would make coarse linens to approach cotton in price, and would tend to check the gradual substitution of that fabric in lieu of flaxen manufacture.

We should like to see our supply of coarse flax drawn from British India instead of Russia, and our medium and fine qualities grown in Ireland instead of Belgium; but we do not anticipate that Indian flax will be a rival of our home production. The cheap labour and fertile soil of the Punjab may produce a fibre that will compete with Russian produce; and if it does so it will be a great blessing to India, and a source of increased prosperity to the linen manufacturers of Ireland and Great Britain.

In conclusion, allow me again to express my warmest sympathy with your views as to increased flax cultivation in Ireland, and I trust the explanation I have given will convince you that our new Indian Flax Company is in no way antagonistic to the sound principles you advocate regarding home production.—Yours, &c., WILLIAM CHARLEY, *Seymour Hill, 26th December*, 1859.

I have already said, but it is no harm to repeat, that I see nothing important to suggest at present by way of improvement in the manufacturing departments of the Irish staple trade. The extension of steam power looms, when supported by a large supply of cheap material, must eventually have a tendency to reduce the cost of production, and to bring the anciently esteemed luxury of wearing linen within the reach of the many, while the regularity of manufacture in these looms will more or less help to correct the want of a uniform system so observable in the old "market" goods.

In the bleaching department, of late years, increased certainty and greater despatch have been attained. The various operations are now conducted by intelligent and often highly-educated men, to whom the modern discoveries of science are really of some use, and who are wise enough to think that complex chemical and mechanical combinations require something more than ordinary skill and attention to ensure a successful result. The linen merchants of Ulster will yield to none in the empire for energy and business-like habits. They require no special stimulus to urge them forward, but will doubtless steadily uphold the supremacy they have already obtained in the old and new world. The only difficulty that meets them of any importance, is the range of hostile tariffs referred to in my last letter, and a very serious difficulty this is.

To compete with foreign producers in a foreign country would be something like approaching an even struggle, if the British merchant had only to overcome the disadvantage of distance, namely, freight and carriage, and risks connected therewith, but when, added to this, a duty of 20, 30, or 40 per cent. must be paid, the struggle appears a hopeless one; and yet the perfection of manufacture in these countries is so great, that even such an exorbitant duty is frequently submitted to to obtain the goods, in countries guarded by high protective tariffs, such as exist in Russia and Austria.

The new treaty of commerce with France is now concluded, and the rate to be levied on Irish linen fabrics is fixed at 15 per cent. and on yarns 10 per cent. These rates, nominally *ad valorem*, are reduced to specific duty on the principle of the former tariff, but in a rather simpler form, the number of classes being less.

By reference to the statistics accompanying my last letter, it will be seen that this new tariff is a great improvement on the old one, and is comparatively liberal. What the effect will be it is impossible yet to determine, but the general opinion in Belfast is that a considerable amount of business with France will ensue before long, though some years may elapse before Gallican prejudices in favour of their natural productions can be quite overcome. May not the completion of this new treaty prove the dawn of a new commercial system on the continent of Europe? If the other great nations follow the example of France, the leading difficulty our Irish merchants now find in their efforts to extend commercial relations with

* I enclose a sample of bleached linen, of medium fineness and excellent quality, manufactured by the Mayor of Belfast, entirely from Indian flax.

foreign countries will be greatly modified, and another bar to the extension and welfare of the linen trade removed.

In the extension and welfare of that trade all truly sensible men must feel an interest. Without its influence the province of Ulster would rapidly degenerate, for as a purely agricultural district it is inferior to the southern portions of Ireland, both in soil and climate; with its influence, creating employment for surplus labour and fine markets for the farmer, the country is prosperous, the labouring population is contented, the capitalist is repaid for his outlay, the landlord obtains a fair, well-paid rent; crime and pauperism are at a minimum point.

Many of the Irish landlords own estates also in England, and are wholly or partly absentees; the prosperity, therefore, of a branch of national industry that amounts in Ireland alone to fully six or seven millions sterling per annum, and helps very effectually to bring back to us something to balance the immense rentals spent out of the country, is a very important matter, and should not be lost sight of by those who feel concerned in their country's welfare.

At present, the deficient supply of raw material, and the phalanx of hostile tariffs, are the chief difficulties to be overcome.

I have pointed out the efforts made in Ulster towards conquering these obstacles. In Russia and the rest of Europe, we have no power or influence over the supply of flax, except the offer of tempting prices. In Ireland and India there is a large field open, and Belfast, almost unaided, is honourably striving to increase in both countries the cultivation of this highly useful plant.

The question of foreign tariffs is now in a more hopeful position than for many years past, though much yet remains to be done. Government should be frequently reminded of the importance of obtaining further concessions, and following up the principle so successfully enunciated in the late French treaty of commerce.

I must now bring my labours as historian of the flax plant and its products in Ireland, to a close. My intention, when I published my first letter some years ago, was merely to contribute a few passing papers, but I found the subject had received so little literary notice, and information connected with it was generally so meagre and scattered, though admittedly a subject that constitutes an important element of our national prosperity, that it appeared to me very desirable to place in regular form an account of the whole matter, its past history, and present position.

The task has certainly not been a disagreeable one, though much more onerous than I ever could have contemplated when beginning it. In conclusion, I may say that the composition of these papers has added considerably to my own stock of knowledge, and I am therefore sanguine enough to hope that the perusal of them may have given some useful information to the numerous intelligent members of the Society of Arts.

OIL SPRINGS.

The following is taken from the City article of the *Times*:—

Numerous advices appear to confirm the great value of the oil springs lately discovered in the United States and Canada. The question as to the duration of their yield remains to be settled, but it seems probable that, owing to the extent of the regions in which they are found, the supply will last many years, and that a proper organisation of railway facilities will alone be needed to cause the production to be among the most important in modern commerce. In the United States the principal deposits are understood to be close to a station on a new railway—the Atlantic and Great Western—which will render their conveyance to New York comparatively inexpensive. In Canada they are about 12 miles from the Wyoming Station of the Great Western of Canada Railway, and some arrangements will be necessary for the transit over that distance, the existing roads being of the worst description. At the site of the principal wells the ground was two years ago covered by an almost unbroken forest. Now there is a resident and constantly increasing population of upwards of 500. During last winter the coaches took an average of 50 people daily to the spot from Wyoming, and many bought land and remained. There are several inns filled to overflowing. Two good hotels are in course of erection. Houses and shanties are rising on all sides, and the greatest activity is everywhere apparent. At present there are about 100 wells in full operation, all yielding oil. The land is held in large blocks, the owner leasing acres and half acres for 99 years. The terms usually are 300 dollars for the privilege and one third of the oil drawn from the wells. The wells are sunk and cribbed to a depth of from 40 to 60 feet till the rock is reached. In many cases surface oil is found before reaching the rock, but it is of rather inferior quality and doubtful yield. After arriving at the rock, the wells through the earth being from 4 to 7 feet square, they drill to the depth of from 40 to 70 feet, between which distances oil is almost sure to be discovered. Wooden tanks, varying from 500 to 2,000 gallons capacity, are constructed close to each well. The oil is pumped into these, and afterwards drawn off into barrels to be sent to market. The cost of a well is very small. Parties are in the district making contracts for sinking wells. Their charge is for sinking through the earth, 2½ dollars per foot, and for drilling through the rock, 2¾ dollars per foot. A well after being commenced usually yields oil in less than 30 days. At these prices a well can be sunk, a tank for 100 gallons made, and a pump and all necessary appliances provided for a sum equal to about £100 sterling. When oil is found, one man at 4s. a day can readily pump 100 barrels, or 4,000 gallons, a day. The cost of the oil, including every expense, and calculating the re-imbursement of every outlay incurred in one year, and also calculating a yield of 15 barrels, or 600 gallons a day, is, it is alleged, absolutely less than a halfpenny sterling a gallon delivered into the tank alongside the well. Very few attempts have yet been made to pump by steam at the place where the oil is most extensively found, nearly all the labour being by hand. This is partly to be attributed to the badness of the roads, preventing the possibility of getting heavy loads into the district, and partly to the yield of the wells being on an average about equal to the quantity a man can easily pump in a day.

A moderate average yield for all the wells now in operation (100) is 15 barrels, or 600 gallons a day. At the rate at which privileges are being disposed of and parties are preparing to sink wells, there will be 500 in operation before Christmas. Taking the present 100 wells only, however, the result is extraordinary. Thus—100 wells, yielding 600 gallons, give 60,000 gallons per day, 360,000 per week, or 18,720,000 per annum. A trustworthy observer remarks:—"Such a yield seems almost fabulous, and yet I believe, from personal observation and inquiry on the spot, that it is within the truth."

MODELS AND DESIGNS FOR FRANCE.

The following is extracted from the *London Gazette*:—

The Right Honourable the Lords of the Committee of Privy Council for Trade have received, from the Secretary of State for Foreign Affairs, a copy of a note from the French Chargé d'Affaires at this Court, stating that the models and designs intended for registration under the provisions of the French law, the benefit of which has been extended to them in pursuance of the 12th Article of the Treaty of the 23rd January, 1860, between Great Britain and France, must be forwarded to the Secretaries of the Conseils de Prud'hommes, at Paris, in sealed packets or boxes, which will be admitted into France free of duty, subject to the necessary formalities.

Instructions have been issued by the French Government to the Presidents of the Conseils de Prud'hommes to

follow the measures adopted at the Registry of the Tribunal of Commerce with regard to foreign trade marks, in cases where the deposit of models is not effected by the actual proprietors. In such cases an agent must be furnished with a power of attorney, either under private seal, or attested before a public notary, bearing a French stamp and authenticated by a French Consul, which must be registered, and delivered by the agent to the Secretary of the Conseils de Prud'hommes. The registration fee is two francs, whatever may be the number of designs or models deposited.

In cases where the power of attorney is written in the English language, a second registration fee will be charged on the translation which is required to be deposited.

MUSEUM OF PRACTICAL GEOLOGY.

The Museum of Practical Geology, Jermyn-street, will be re-opened to the public on Tuesday next. During the vacation some important additions have been made to the wall decorations in the Hall, consisting of inlaid slabs of polished granites, porphyries, marbles, and alabaster, by Mr. Macdonald, of Aberdeen, and Mr. Hall, of Derby. Some of these specimens have never before been employed in the arts, and deserve the attention of architects.

Home Correspondence.

READINGS AT MECHANICS' INSTITUTIONS.

SIR,—I have met with instances where Miss Nightingale's "Notes on Nursing" have been read with much interest to classes of adult persons, and to advanced classes of girls in schools; and I have been assured that the information thus promulgated has been early attended with instances of beneficial sanitary reforms at their homes.

The discussions on the text have elicited interesting local illustrations, and valuable directions of practical applications of the principle to peculiar local conditions.

Miss Nightingale has prepared a new and cheap edition of the work, with some abridgement, but with important additions, for the use of the labouring classes.

I venture to recommend, as highly important, that at each Mechanics' or Literary Institution, some one should be asked to read particular chapters of the work, as papers, to the members of the Institution, and then take discussions upon them, in which the observations of members might be contributed. (It were most desirable if some physician, or medical or health officer, could be got to undertake the task.)

The chapter in the new edition on "Ventilation and Warming," would form a good paper for one evening's discussion.

The chapter on the "Health of Houses" would also serve as another most important chapter for another evening's reading and discussion.

The short chapter on "Personal Cleanliness" would supply a text for a separate instructive discourse and discussion.

Considering the immense proportion of deaths in the infantile stage in the United Kingdom, the great mass of which are preventible, the chapter on "Minding Baby" is one of commensurate importance, on which the attendance of the females of the families of members and their friends might be specially invited; and the medical practitioners of the neighbourhood should be asked to state the results of their observations.

Amongst competent medical professors of sanitary science, in America as well as in England, I have met with but one opinion, coinciding with my own, on the practical soundness and great value of the expositions in the "Notes," of sanitary principles, made from the authoress's own long and varied observation.

By the liberality of Mr. Harrison, I am enabled to propose to the Council, to forward to the managing committee of each Institution a copy of the new edition of the "Notes," with the view to their consideration of the eligibility of their use for the purpose I have suggested.

It may be almost unnecessary to add, that much of the practical suggestions of the "Notes" would be most congenial to female classes.

I am, &c.,

EDWIN CHADWICK.

Richmond, Surrey, August 20th.

A SUBSTITUTE FOR SOME PATENTS.

SIR,—It is a disputed point whether patents do more good or harm. They are believed to stimulate men, by the hope of large profits, to bring their inventions to perfection, and to induce them to publish the details of their inventions, instead of keeping them concealed as they might try to do, if that were the only way of securing profit from them. On the other hand, many patents cost much more than they are worth, and those which do succeed cost the public very much more than the patentees get. From the very nature of the case this must necessarily be so. A patentee is compelled to spend much money unproductively (which he must either lose or charge his customers for), first in getting his patent; next in defending it from piracy; and, lastly, as his capital is limited, he is probably induced to try to make a large rate of profit from a small business, instead of the ordinary rate of profit from a business extended to its natural dimensions. For these and other reasons the cost of a patented article is much higher than if there were no patent, and a part only, often a small part, of the excess is real profit to the patentee. Often, moreover, the real inventor is not the one most benefited, he having been obliged to sell his interest for a trifle before his invention has been brought into profitable use; still more frequently all concerned meet with nothing but loss and disappointment. But this is not the worst. These unsuccessful patents are not simply useless, they may be unmitigated nuisances—useless to their possessors, injurious to everyone else—by impeding the progress of other improvements of which they may be a part, though perhaps but a small part.

Notwithstanding all these heavy drawbacks, I believe the general opinion is in favour of allowing real inventors to secure for themselves a limited right of exclusive use, and until some other mode of rewarding them for their ingenuity and perseverance, and inducing them to make their inventions public is devised, it is hard to see how patents can be fairly refused.

It must, however, be very evident that it is most desirable that the number of patents should not be greater than is unavoidable, and if some other method of rewarding inventors could be devised, free from risk to them, and not involving any increase to the cost of the articles produced, it might be of great advantage both to them and to the public; that is, they might receive a larger amount of nett profit for successful inventions, with very much less charge to the public, while unsuccessful ones would be simply useless without doing the harm a patent does by enabling those who cannot succeed with it, to prevent others from trying.

All this might, I think, be accomplished by a very simple arrangement, for making a very small charge upon all instead of a heavy charge upon part of the community, to reward those who succeed in making useful inventions which are of benefit to the nation at large. My proposal is, that a department of government shall publish descriptions of any inventions or improvements in the arts, &c., &c., which their authors think fit to send, and which they decline to patent; that every invention or improvement so published may be freely used by any one, and that the inventor or improver shall be entitled to a reward, to be paid by Parliament for a limited period, calculated in proportion to the estimated value to the nation of his improvement.

I believe a very small per centage upon this value would

pay inventors better than they are now paid by the profits on patents, and that a few thousands a year paid directly by Parliament, would save many thousands now paid by the public, to say nothing of the losses suffered indirectly by impediment to improvement that patents so often prove. I do not, however, propose that inventors should be compelled to take their chance of the Parliamentary reward. I think they should have the option of taking out a patent if they consider that most to their interest. I would try only to induce them not to do so, by offering them an alternative, which, if Parliament would be liberal without being profuse, might reward inventors better and tax the public less.

It may probably be objected that it seems unjust to tax those who do not use inventions, to save those who do; but that is a weak objection, for whatever will promote or remove impediments from the progress of industrial arts in England, most increase the national prosperity and wealth, and must, therefore, be profitable to us as a nation.

I am, &c., P. H. HOLLAND.

36, Camden-square.

Proceedings of Institutions.

BURY ST. EDMUND'S ATHENÆUM.—The eighth annual report of the Bury St. Edmund's Athenæum and Suffolk Institute of Archæology, Statistics, and Natural History, states that the library issues for the past year have been:—Books, 12,400; periodicals, 3,460; papers, 1,380. This return, allowing for the circumstance that the library has been open during the whole year, shews an increase upon the issues of last year, and is nearly equal in amount to the year preceding last year, which gave the largest return of books issued since the formation of the library. A considerable part of the increase of the issues this year has been due to the exertions of the members of the Amateur Reading Society. The additions to the library, by purchase, have numbered 120 vols.; by presentation, 5 vols. The attendance at the Working Men's Free Reading Room has been very regular, but has not increased upon last year; the men have been orderly, and appear to begin to value the privileges accorded to them. In compliance with the resolution adopted at the last general annual meeting, the Lecture Committee, knowing full well the importance of economy in their department, have endeavoured to reduce, within the least possible limit, the expenditure attendant on lectures and entertainments. The following were the lectures delivered:—"Italy, past and present," by the Rev. Lord Arthur Hervey, M.A., the Marquis of Bristol, Patron, in the chair; "Electro Magnetism," by the Rev. Edwin Sidney, M.A., with the experiments manipulated by Mr. Ladd; "The Study of History," by Professor Kingsley, M.A.; "The Lost Polar Expedition," with illustrations and relics, by Capt. Parker Snow; "The Ely Lantern," by the Very Rev. the Dean of Ely; "A Visit to the Alps, in 1860," by the Rev. Edwin Sidney, M.A., illustrated with views and photographs by Messrs. Carpenter and Westley; A Conversazione, Sir Charles Bunbury, Bart., in the chair; Papers—"Richard Bayfield, Monk of Bury," by John Greene, Esq.; "On Floral Fêtes," by W. Orbell Kitchener, Esq.; "Novel Reading," by the Rev. J. L. Williams, M.A.; and "On Wit and Humour," by George Grossmith, Esq. With reference to class instruction, eighty-five names were entered for the various classes agreed upon by the committee at the commencement of the season. The 1st and 2nd French classes have been well and regularly attended; many of the members having continued their studies during several seasons. The teacher reports that "he is very much pleased with the progress made in both the French classes, also with the increased interest the members seem to feel in their studies, and with their uniform good attendance." The Latin class also promised well; but as most of the members were employed as gardeners, and were required to be in the glass-houses during the severe frost, the attendance was very irregular. The number of pupils who have attended the drawing classes, and the work which has been done (as shown at the Conversazione), are most gratifying. With the consent of the Library Committee, the first reading-room has been permanently fitted up as a class-room, with moveable frames for drawings, and shelved cupboards, which are furnished with models. Thirty-four pupils have received instruction, the greater number of whom have been most regular in their attendance. Whilst the Institution and the members of classes are deeply indebted to all the class teachers, it is difficult to over-rate the obligations which they owe to Mr. Thomas, the teacher of drawing, or to speak too highly of the kindness with which he devotes so much of his time and exertions to the improvement of his pupils. During the past season he has given no fewer than 487 free drawing lessons. The committee have great pleasure in adding, that J. H. Porteus Oakes, Esq., having visited the class, expressed his satisfaction by a handsome donation, to be laid out in models for the use of the class—in addition to which he has made an offer that, as soon as one of the pupils has given proof of his fitness and ability, and has made the requisite progress in drawing, he will undertake to apprentice him as a glass painter, free of expense, and will also assist in maintaining him during his apprenticeship. Readings and lectures to the working classes only were delivered during the winter months, by the following gentlemen:—Rev. J. Richardson; Johnson Gedge, Esq.; Rev. Alfred J. Perry; Rev. J. L. Williams; James Sparke, Esq.; Rev. W. F. Newton. The committee of archæology and natural history have again the pleasure to report that its numbers have been sustained; that in the districts visited during the past year, the Institute has, as heretofore, met with the most gratifying reception, and that they have been instrumental in bringing to light much valuable historic and archæological information connected with the respective localities; and the members and their friends have been permitted to inspect many choice and otherwise unseen stores of ancient art. In the museum report, for 1859, it was mentioned that a subscription had been opened for the establishment of a permanent fund for purposes of natural history. The sum of £29 9s. 6d. was subscribed towards this desirable object, of which £6 12s. 6d. remains to be collected, and £16 19s. has been expended. By this means the committee have been enabled to make many important additions to their collection; including a complete set of Mr. Hawkins's models of extinct animals, several collections of fossils, &c., and two fine lions, which, with other specimens, now only wait for cases before being placed in the museum. It is now thought advisable to enlarge the fund as much as possible, but to apply it to general museum purposes, as well as to those of natural history—so as to add to the interest, and develop the educational uses of the museum. The amateur reading society, during the past session, has been most successful in its operations; for not only have the members' practice meetings been well attended, but the public readings also have met with the greatest encouragement from large and appreciating audiences. Of preliminary and other meetings 8 have been held; members' readings for practice 26; average attendance at such meetings, 20; public readings, 6; soirée, 1; authors from whom subjects for reading have been selected, 116; number of pieces read, 340. From an analysis of the readings it has been found that the greatest number of extracts have been chosen from the following authors:—Addison, Bulwer, Barham, Byron, Campbell, Coleridge, Cowper, Dickens, Gray, Helps, Hemans, Hood, Keble, Kingsley, Knowles, Lamb, Longfellow, Macaulay, Milton, Montgomery, Moore, Poe, Praed, Proctor, Rogers, Ruskin, Scott, Shakspeare, Sheridan, Southey, Tennyson, Withers, Wordsworth and Young. The balance sheet of this society for the session of 1860 and 1861 shows that the receipts have amounted to £20 8s. 11d., and that there is a balance in hand of

£8 16s. 4½d. With this balance a set of books has been purchased for presentation to the library of the Athenæum, a clock has been purchased for the observatory. During the last 12 months about 500 persons have availed themselves of the telescope.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, August 30th*, 1861.]

Dated 25th April, 1861.

1036. P. G. Gardiner, New York—Imp. in the construction of springs

Dated 26th July, 1861.

1873. J. F. Bourne, Demerara—Certain imp. in the construction, armament, and equipment of batteries, floating or otherwise, for war purposes.

Dated 5th August, 1861.

1943. R. A. Brooman, 166, Fleet-street—Imp. in locks and other fastenings and in keys.

Dated 13th August, 1861.

2006. J. H. Elvans, 7, Guildford-place, Lower Kennington-lane—An improved steel busk or stay fastening.
2010. J. Lancaster, Princes-street, Bedford-row—A new method of producing sand.
2012. J. G. Renny, Brussels—Imp. in the manufacture of articles of furniture by utilizing certain parts of the cedar tree in such manufacture, which have heretofore been considered and treated as waste.
2014. N. Common, Brighton—Imp. in apparatus applicable to water-closets and urinals.

Dated 14th August, 1861.

2016. W. Robertson, Manchester—Certain imp. in machines for preparing to be spun cotton and other fibrous materials.
2018. N. Cox, Chester—Imp. in the construction of iron ships, the said imps. relating to the method of attaching or securing bulkheads to the frames or ribs thereof.
2020. F. Durand, Paris—Imp. in the manufacture of metallic tubes.
2022. G. J. Wainwright, Dukinfield, Cheshire—Imp. in certain parts of machinery or apparatus used in preparing and spinning cotton or other fibrous materials.
2024. E. Edwards, 13, Beaufort-buildings, Strand—Imp. in machinery or apparatus for separating mineral ores, coal, and other substances from impurities.

Dated 15th August, 1861.

2028. A. Lebaudy, 12, Rue de Douai, Paris—Imp. in towing vessels or boats on rivers. (A com.)
2033. P. Webley and T. W. Webley, Birmingham—A new or improved elevating rifle sight.
2034. F. A. Kain, Redhill, Reigate—An improved manufacture of artificial stone or earthenware applicable for bricks, tiles, retorts, railway sleepers, and other articles.
2036. S. Desborough, Noble-street, St. Martin's-le-Grand—Imp. in the manufacture of umbrellas and parasols.
2037. A. F. Menard, 10, Rue de Strasbourg, Paris—Imp in tanning, and in the apparatus employed therein. (A com.)
2038. C. W. Kesselmeyer, Manchester, and T. Mellodew, Oldham—Imp. in the manufacture of velvets and velveteens.
2040. J. Faucherre, Green-terrace, Middlesex—An improved mode of manufacturing gold dials.
2041. R. D. Chatterton, Highbury-terrace—Imp. in transmitting motive power, especially applicable to piston propellers.
2042. T. Murcott and C. Hanson, Haymarket—Imp. in breech-loading arms.

Dated 16th August, 1861.

2044. A. V. Newton, 66, Chancery-lane—Imp. in knitting and in machinery therefor. (A com.)

Dated 17th August, 1861.

2045. H. C. Hill, Stalybridge—Imp. in the construction of fire-proof buildings.
2046. T. Settle, Bolton—A certain imp. in machinery or apparatus employed in preparing cotton, wool, flax, and other fibrous substances for spinning.
2047. E. Sutton, Radcliffe, Lancashire—Certain imp. in machinery or apparatus for preparing cotton and other fibrous substances for spinning.
2048. M. H. Randle, 22, Ludgate-hill—An imp. in sous-juppe or under petticoats for distending articles of dress and preserving the shape or form thereof.
2049. P. Walters, Wolverhampton—Imp. in machinery for cutting, sawing, and slicing or planing wood and other substances.
2052. R. Caunce, Nottingham—Imp. in carding engines.

Dated 19th August, 1861.

2054. Z. Colburn, 15, Tavistock-street, Bedford-square—Imp. in the construction of suspension bridges.
2055. J. Robb, Aberdeen—Imp. in ventilating.
2056. G. T. Selby, Smethwick, Staffordshire—An imp. in surface condensers.
2058. W. H. Smith, London—Imp. in the preparation, application, and manufacture of peat.
2059. W. Gossage, Widnes, Lancashire—Imp. in the manufacture of certain kinds of soap, and in the construction of apparatus to be used in such manufacture.
2060. W. Firth, Burley, Leeds—Imp. in machinery for digging or turning up soil, mowing, reaping, and other agricultural purposes.

Dated 20th August, 1861.

2062. B. Hargreaves and J. Hargreaves, Burnley—Imp. in the valves of steam engines.
2066. H. Emes, Adelaide-road, Haverstock-hill—Imp. in dress fastenings which are also applicable to other purposes.
2068. R. A. Brooman, 166, Fleet-street—An improved steam mill or apparatus for transmitting motive power. (A com.)
2070. S. Warwick, Lower-road, Islington—An imp. or imps. applicable to concertinas.
2072. J. Platts, Glasgow—Imp. in looms for weaving.
2076. G. F. Muntz, French Halls, Birmingham—Imp. in sheathing iron ships or vessels.

Dated 21st August, 1861.

2080. C. A. Wheeler, Swindon, Wiltshire—Imp. in preventing wind draughts at the foot of doors and allowing them to open over carpets or other substances without the use of rising hinges.
2082. W. Mason, Liverpool—An improved soap. (A com.)
2084. W. Clark, 53, Chancery-lane—Imp. in the construction of buildings whereby to utilize the waste heat passing up the chimneys. (A com.)
2086. N. Salamon, 8, Ludgate-street—Attachments or apparatus for sewing machines. (A com.)
2090. A. Jervis, Coventry—Improved machinery for the manufacture of pleated, ribbed, and looped fabrics.
2092. T. Grahame, Worthing, Sussex—Imp. in the construction of boats, rafts, and other floating structures.
2094. J. Kane, Templemoyle, near Dungwen, Ireland—Imp. in treating flax, hemp, and other analogous substances which yield fibres for the purpose of manufacturing from them fibres adapted to be spun into yarn and thread.

Dated 22nd August, 1861.

2096. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the preparation of pulp for paper. (A com.)
2098. E. Landsberg, sen., Paris—Imp. in porte-robes or buttons for holding up the skirts of ladies' gowns.
2100. L. M. Casella, Hatton-garden—Imp. in mercurial thermometers.
2102. W. Baines, Smethwick, Staffordshire—Imp. in the construction of girders, frames, or other apparatus fixed or moveable, and for certain peculiar forms or sections of iron used therein.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

2088. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Certain imp. in presses for lithographic printing. (A com.)—21st August, 1861.
2119. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the propulsion and steerage of ships or vessels, and in the construction and arrangement of the machinery connected therewith. (A com.)—26th August, 1861.

PATENTS SEALED.

[*From Gazette, August 30th*, 1861.]

August 30th.

453. A. Barclay.
523. F. Tolhausen.
526. C. Smith and J. Carrick.
528. L. L. Sovereign.
534. T. Haigh and R. A. Robertson.
543. E. Sabel.
545. J. James.
546. G. Davies.
549. H. Hirsch.
554. T. Petitjean.
558. J. M. Carter.
561. E. Alcan.
562. C. Hanson.
575. W. E. Wiley.
578. W. S. Kennedy.
586. J. H. Johnson.
607. T. F. Griffiths.
648. A. Granger.
730. J. Potter.
733. G. J. B. Loyer.
757. J. Smith, jun.
849. W. Slater.
861. A. Shanks.
891. J. Lancelott.
920. A. Shanks.
937. W. Jenkins.
1205. W. Clark.
1470. J. Whitehead.
1629. S. Wenton.
1648. M. Henry.
1668. A. V. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, August 30th*, 1861.]

August 26th.

1949. R. Knight.

August 28th.

1965. J. L. Clark, F. Braithwaite, and G. E. Preece.

[*From Gazette, September 3rd*, 1861.]

August 29th.

1971. M. A. F. Mennons.

August 30th.

1988. A. V. Newton.

August 31st.

1985. J. Sloper.
1998. J. Robertson.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, September 3rd*, 1861.]

August 31st.

1892. J. Seithen.